LOCAL OSCILLATOR

Supply decoupling

Reference Input

Loop Filter

Output: 1271 MHz, +5dBm
+ Harmonics

FIRST MIXER

Supply decoupling

Input from
Low Noise Amplifier
Fm ~1750 dBm/Hz
1.3 GHz to 1.55 GHz

Input Balun
ANR1622

Output freq
149 MHz

BW 300 MHz, total power:
(-174dBm/Hz + 24dB) * 300 MHz
= -51 dBm = 0.6mVrms

3RD ORDER CHEBYSHEV
BAND PASS 135-165MHz
(MIRROR + SPUR FILTER)

BW 30 MHz, total power:
(-174 dBm/Hz + 10*log(30MHz)) * 30 MHz
= -61 dBm = 200 uVrms

LOW-NOISE
IF AMPLIFIER

BW 30 MHz, total power:
(-174 dBm/Hz + 38 dB + 15 dB) * 30 MHz
= -46 dBm = 1.1 mVrms

9.5dB SWITCHABLE
ATTENUATOR

20dB IF AMP

BW 30 MHz, total power:
(-174 dBm/Hz + 10*log(30MHz)) + 30MHz
+ 20dB = -24dBm = 63mVrms

Contribution of (out-of-band) noise added after first IF filter:
Spectral noise from low-noise block amplifier, after second amplifier:
-174dBm/Hz + 20B [NF] + 20dB [Gain of 2nd amp] = -132 dBm/Hz
Integrated noise within 4 MHz bandwidth (BW of second amp)
= -68 dBm which is much smaller than the actual signal --> ok

3RD ORDER CHEBYSHEV
BAND PASS 135-165MHz

Remaining broad-band noise level:
-66 dBm + 4B[30 MHz / 400 MHz] = -77 dBm

20dB IF AMP

BW 30 MHz, total in-band power from input:
(-174 + 38 + 15 + 20 + 20) + 30MHz
= -6dBm = 112 mVrms

Broad-band noise:
-57 dBm inherited from earlier stages
(spread across 30 MHz)

(-174dBm/Hz + 12 dB [NF]) * 400 MHz [BW]
= -76 dBm new noise from this amp
(spread across 400 MHz)

9.5dB SWITCHABLE
ATTENUATOR

4 MHz BW
IF FILTER
@149 MHz
SF2120C

U?

BW 4 MHz, signal level:
(1% dBm/Hz + 36dB + 15dB
+ 20dB + 20dB) * 4MHz
= -15dBm

20dB IF AMP

Signal level: +5 dBm [BW 4 MHz]
with both attenuators
with both attenuators turned off.

Both attenuators on: AT 2*9.5 dB
-> signal level -14dB + 45 mVrms = 0.13Vpp

wideband noise generated by this amplifier
(spread across 400 MHz BW, NF 12dB,
bandwidth ca. 400 MHz, NF 12dB =>
-76dBm broadband noise = 35uV rms < 115B

14 MSPS
ADC
(DIGITAL
BASE-BAND
CONVERSION)

TODO:
Limiter diode?

LPC4330
LQFP144

JTAG connector

TCK return

LO control

clock generated by software

4 MHz reference
crystal oscillator

Sheet: /
File: board.sch

Title:

Size: A2 | Date: | Rev:

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